

5.3 # 23, 27, 29, 35, 37, 45, 46

23. (a) f is increasing on $(-\infty, -2) \cup (0, 2)$

(b) f is decreasing on $(-2, 0) \cup (2, \infty)$

(c) f has an extremum at $x = -2$, $x = 0$ and $x = 2$

27. position function $x(t) = t^3 - 3t + 3$

(a) velocity $v(t) = 3t^2 - 3$



(b) acceleration $a(t) = 6t$



(c) The particle is moving to the left at $t = 0$.

on $(0, 1)$ the particle moves to the left and slowing down.

At $t = 1$, the particle stops moving and changes direction.

On $(1, \infty)$ the particle moves to the right and speeds up.

29. (a) $v(t) = 0$ at $t \approx 1.2$ and $t \approx 6$ and $t \approx 9.8$ and $t \approx 15$

$a(t) = 0$ at $t \approx 4$ and $t \approx 8$ and $t \approx 12$

35. $y = x^3 + 3x^2 - 2$ $y' = 3x^2 + 6x$ $y'' = 6x + 6$ $y''(-1) = 0$

$y'(0) = 0$ & $y'(-2) = 0$



$y(x)$ has a local max. of $y = 2$ at $x = -2$ since $y'(-2) = 0$ and $y''(-2) < 0$.

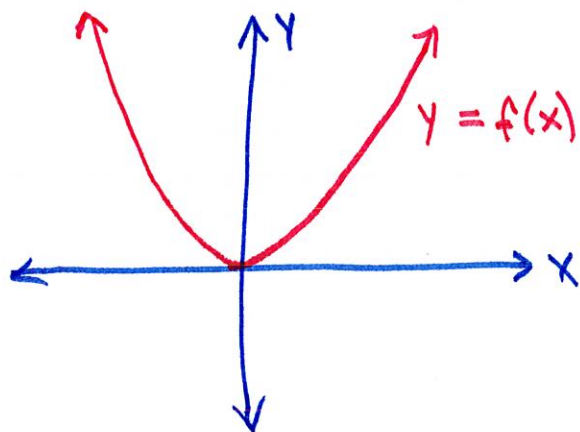
$y(x)$ has a local min. of $y = -2$ at $x = 0$ since $y'(0) = 0$ and $y''(0) > 0$

37. $y = xe^x$ from #13 $y' = e^x(1+x)$ Therefore $y'(-1) = 0$

From #13 $y''(x) = e^x(2+x)$. $y''(-1) = e^{-1}(2+(-1)) = \frac{1}{e} > 0$

$y(x)$ has a local min. of $y = -\frac{1}{e}$ at $x = -1$ since $y'(-1) = 0$ and $y''(-1) > 0$.

45.



46.

